

calculation means and center coordinate positions of dots of a predetermined pattern code with respect to the true center coordinate positions of the markers;

- a data reading coordinate calculation means for calculating a data reading coordinate position in the block on the basis of the coordinate positions of the plurality of true centers of the markers calculated by the marker true center calculation means;
- a data reading coordinate discrimination means for discriminating whether or not the data reading coordinate position indicates a center or boundary of a pixel constituting the image by a calculation at an accuracy not less than a predetermined multiple of the pixel constituting the image;
- a reading pixel black/white discrimination means for, when the data reading coordinate discrimination means determines that the data reading coordinate position indicates the center of the pixel constituting the image, extracting information from one pixel on the image indicated by the data reading coordinate position; and
- a reading surrounding pixel black/white discrimination means for, when the data reading coordinate discrimination means determines that the data reading coordinate position indicates the boundary of the pixel constituting the image, extracting information from a plurality of pixels contacting the boundary indicated by the data reading coordinate position and discriminating vanishing data indicating whether or not information is indefinite.

More specifically, by increasing the reading accuracy, reading indefinite data can be calculated. Furthermore, using this reading indefinite data, error correction performance in the next stage can be improved.

(17) The information reproducing apparatus described in (16) is characterized by further comprising an address code vanishing correction means for performing vanishing correction of an address code used for identifying the block on the basis of the vanishing data.

More specifically, since the vanishing correction of a block address can be performed and the correction rate can be improved, omission of blocks can be eliminated.

(18) The information reproducing apparatus described in (16) is characterized by further comprising:

- a modulated data correction means for correcting modulated data recorded in the block on the basis of the vanishing data;
- a vanishing data changing means for changing the vanishing data upon correction of the modulated data; and
- a means for ORing the vanishing data changed by the vanishing data changing means to obtain modulation unit vanishing data.

More specifically, since data in the modulation unit can be corrected, reading errors can be eliminated. Furthermore, whether or not correction can be made in the modulation unit can be easily calculated by calculating an OR of data. Furthermore, since the modulation unit vanishing data can be used in error correction in the next stage, correction performance can be improved.

(19) An information recording medium which comprises a portion that records multimedia information including at least one of audio information, video information, and digital code data in the form of an optically readable code pattern, is characterized by comprising:

- a reference scale used for detecting a skew of the code pattern.

More specifically, the skew of the image pickup means can be calculated from the image without adding any special

skew detection device, and after the distortion of the image caused by the skew is corrected, a data reading operation is performed, thus eliminating reading errors.

As described above, according to the present invention, an information reproducing apparatus and an information recording medium which can reliably reproduce information recorded in the form of a code pattern even when a skew occurs between the reading unit and the recording surface upon a manual scanning operation or the optical system itself has distortion can be provided.

Additional embodiments of the present invention will be apparent to those skilled in the art from consideration of the specification and practice of the present invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with the true scope of the present invention being indicated by the following claims.

What is claimed is:

1. An information reproducing apparatus comprising:

image pickup means for optically reading, from an information recording medium which comprises a portion that records multimedia information including at least one of audio information, video information, and digital code data in the form of an optically readable code pattern, the code pattern;

conversion means for converting the code pattern read by said image pickup means into code data as an image;

data reading coordinate calculation means for calculating a data reading coordinate position indicating a reading position of data in a block at an accuracy higher than a resolution of the image upon extraction of the block as a predetermined unit of data from the code data by processing the code data converted by said conversion means;

data determining means for determining data by performing reading using at least one of a pixel value of the data reading coordinate position and a plurality of pixel values around the data reading coordinate position based on the data reading coordinate position calculated by said data reading coordinate calculation means; and

accuracy discriminating means for discriminating a degree of accuracy of the data determined by the data determining means based on the data reading coordinate position calculated by said data reading coordinate calculation means.

2. An information reproducing apparatus according to claim 1, further comprising coordinate discriminating means for determining whether the data reading coordinate position is located at a center of a pixel or on a boundary of the pixel based on values of the data reading coordinate position calculated by said data reading coordinate calculation means, said accuracy discriminating means discriminating the degree of accuracy of the data determined by the data determining means based on a determined result of said coordinate discriminating means.

3. An information reproducing apparatus comprising:

image pickup means for optically reading, from an information recording medium which comprises a portion that records multimedia information including at least one of audio information, video information, and digital code data in the form of an optically readable code pattern, the code pattern;

conversion means for converting the code pattern read by said image pickup means into code data as an image;

marker detection means for detecting a plurality of markers representing boundaries of a block upon extraction